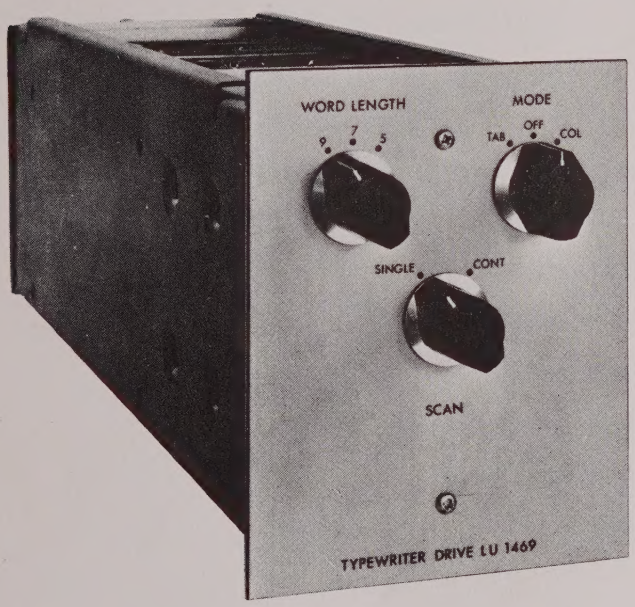
TYPEWRITER DRIVE UNIT LU 1469



SOLARTRON

SOLARTRON

TECHNICAL MANUAL

MP MASTER
MA24419

LIST OF CONTENTS

SECTION		PAGE
1	INTRODUCTION	1
2	SPECIFICATION	1
3	INSTALLATION	2
4	OPERATION	4
5	PRINCIPLES OF OPERATION	6
6	TECHNICAL DESCRIPTION	10
7	TEST PROCEDURE	14
	COMPONENTS LISTS MAIN UNIT	16
	PCB 14699001	18
	PCB 14699002	21
	PCB 14699003	24
	PCB 14699004	26
	PCB 14669004	29
	PCB 14679003	30
	PCB 14679004	32

LIST OF TABLES

TABLE		
1	Plug PLB Details	2
2	Plug PLC Details	3
3	Scanner Sampling Speeds	4
4	Word Formats	5
5	Range and Multiplier Identification	5

Contents Cont:-

LIST OF ILLUSTRATIONS

DIAGRAM		PAGE
1	Mains Input Plug PLA	2
2	Simplified Block Diagram. Typewriter Drive Unit LU1469	6
3	Logic Diagram. Typewriter Drive Unit LU1469	7
4	Logic Board C Waveforms for first five scanning points	11
5	Serialiser Output Waveforms for first five positions	12
6	Component Location - Main Unit	17
7	Component Location - Solenoid Drive Board B (14699001)	20
8	Component Location - Relay Drive Board G (14699002)	23
9	Component Location - Gate Logic Board D (14699004)	28
10	Component Location - Input Gating Two Board F (14679004)	34
11	Component Location - Logic Board C (14699003)	35
12	Component Location - Input Gating One Board E (14679003)	35
13	Component Location - Power Board A (14669004)	36

FIGURE		
1	Circuit Diagram - Typewriter Drive LU1469	Rear of Manual

TYPEWRITER DRIVE LU1469

1. INTRODUCTION

The module has been specifically designed to convert the output information produced in the Compact Logger Systems LY1470 and LY1471 to a form suitable for driving solenoid operated IBM Model B or modified Smith-Corona electric typewriters. It may also be used to drive any other typewriter having similar input requirements.

The logged data may be tabulated or columnated in words 9, 7 or 5 characters. Time words from a Digital Clock can also be included in the records, if required.

2. SPECIFICATION

Electric Typewriters:	(a) Solenoid operated IBM Model B (b) Smith-Corona Compact 250 modified for solenoid operation by Solartron.
Word Length:	9, 7 or 5 characters.
Speed	The System Scanner may be operated at a speed of one channel per second when a 5 character word is being typed or one channel every two seconds to give 7 or 9 character words
Inputs:	9 Character Word: - Channel Identity (Tens and Units), Polarity, Voltmeter or Clock Reading, Voltmeter Range and Multiplier. 7 Character Word: - As for a 9 character Word with the exception of Voltmeter Range and Multiplier. 5 Character Word: - As for a 7 Character Word with the exception of Channel Identity.
Input Levels:	Voltmeter, Clock and Channel Identity signals are in binary coded decimal form:- '1' line = -5V to -13V and '0' line = +1V to -2V; Positive Polarity = '1' on one line, Negative Polarity = '0' on same line; Voltmeter Range and Multiplier = '1' from a system patchboard fed from system Scanner.
Outputs:	Signals (i) controlling type out of digits 0 to 9 and '-' sign (negative polarity) and (ii) commanding carriage return/line feed, space (positive polarity prior to, and non-significant after, Voltmeter or Clock Reading) and red ribbon shift functions. All operate 48V solenoids.
Alarm Indication:	Type out in red.
Type Command:	Positive-going end of conversion signal normally derived from Digital Voltmeter LM1420 or type command from Digital Clock LU1463.
Power Requirements:	95V to 130V or 190V to 260V, 50-60 c/s.
Ambient Temperature:	$0^{o}C$ to $50^{o}C$.
Weight:	5lb. 8oz. (2.5kg.) approximately.
Dimensions: (nominal)	5. 25 in. x 4. 25 in. x 14 in. (13.3cm x 10.8cm x 35.5cm).

3. INSTALLATION

General

The module is usually supplied as part of a complete system and details of its front panel switch settings and input and output connections will be found in the preliminary sections of the system handbook.

It is also available as a separate item, the general information given below supplying the data required for its use in any special set-up.

Connector Details

Plug PLA

Mains power is applied through fixed plug PLA on the rear panel of the module, the positions of the line, neutral and earth pins being shown in the diagram. No mains on/off switch is fitted.

Mains Input Plug PLA
Diagram 1.

Table 1. Plug PLB Details

Pin Designation	Service	Remarks
A	Channel Identity 10)	
B	Channel Identity 1)	Derived from Scanner in 1, 8421
C	Channel Identity 2)	Binary Coded Decimal Form
D	Channel Identity 4)	
E	Channel Identity 8)	
F	LM1420 Range Identity 1	200V)
H	LM1420 Range Identity 2	20V)
J	LM1420 Range Identity 3	2V) Pre-programmed Pinboard
K	LM1420 Range Identity 4	200mV) selection in Compact Logger.
L	LM1420 Range Identity 5	20mV) Derived from LU1461 Scanner.
M)	LM1420 Range Multiplier	0=x1)
N)	x1, x2 and x4	1=x2)
		2=x4
P	Voltmeter Reading 1^4	) Thousands in 21 BCD
R	Voltmeter Reading 2^4	) form
S	Clock Reading 1)	Tens of Hours in 21 BCD form
T	Clock Reading 2)	
U	Voltmeter Reading 1^3)	
V	Voltmeter Reading 2^3)	Hundreds in 8421 BCD form
W	Voltmeter Reading 4^3)	
X	Voltmeter Reading 8^3)	
Y	Clock Reading 1)	
Z	Clock Reading 2)	Units of Hours in 8421
a	Clock Reading 4)	BCD form.
b	Clock Reading 8)	
c	Voltmeter Reading 1^2)	
d	Voltmeter Reading 2^2)	Tens in 8421 BCD form
e	Voltmeter Reading 4^2)	
f	Voltmeter Reading 8^2)	
h	Clock Reading 1)	Tens of Minutes in 8421
j	Clock Reading 2)	BCD form
k	Clock Reading 4)	

Table 1. Plug PLB Details (continued)

Pin Designation	Service	Remarks
m	Channel Identity 20	Derived from Scanner in BCD form
n	Voltmeter Reading 1^{1})	Units in 8421 BCD form
p	Voltmeter Reading 2^{1})	
r	Voltmeter Reading 4^{1})	
s	Voltmeter Reading 8^{1})	
t	Clock Reading 1)	Units of Minutes in 8421 BCD form
u	Clock Reading 2)	
v	Clock Reading 4)	
w	Clock Reading 8)	
x	Print Clock Information	) Priming signals derived from
y	Print Voltmeter "	) Clock Print Command Bistable
z	Alarm No. 1	) Derived from system Off Limit
AA	Alarm No. 2	) Detector. '1' to command red
		) ribbon shift.
BB	Voltmeter Polarity	+ = '1'; - = '0'
CC	Channel Identity 40	Derived from Scanner in BCD form
DD	Print Command	-12V to 0V pulse from voltmeter
EE	Start Scan Command to Scanner	For use in the system Scan Continuous mode.
FF	End of Scan signal from Scanner.	Initiates Carriage Return
HH	Channel Identity 80	Derived from Scanner in BCD form

Table 2. Plug PLC Details

Pin Designation	Service	Remarks
A	To energise digit solenoid 1	)
B	" " " " 2	)
C	" " " " 3	)
D	" " " " 4	)
E	" " " " 5	)
F	" " " " 6	)
H	" " " " 7	)
J	" " " " 8	)
K	" " " " 9	)
L	" " " " 0	) Connected to Electric
M	" " polarity " -	) Typewriter
N	" " space "	)
P	" " tabulate "	)
R	" "carriage return"	)
S	" " ribbon shift "	)
W	-48V supply to solenoids.	)
X	To energise ribbon shift solenoid.	)

Mains Selector Plug

The mains selector plug (MSP1) at the rear of the module is engraved with 115V and 230V markings. It should be adjusted so that the metal pointer at the side of the module is opposite to the marking corresponding to the user's mains voltage.

Mains Fuse

Check that the mains fuse is correctly rated - 1A for 230V supplies and 2A for 115V supplies. The fuseholder is located between MSP1 and PLA.

Mounting Arrangements

The Compact Logger cabinets have been specifically designed to accommodate a number of identical size modules, of which the Typewriter Drive is one. The modules slide into the cabinet space frame along lips on their side panels which act as runners. They are retained by a wing nut at the rear. Interconnecting plugs are free on their loom to avoid connector alignment problems. 50 way connectors, where used, are retained by straight knurled edge screws which must be released to remove the free mating components.

A Mounting Rack, LY1472, is available for housing a maximum of four modules of Typewriter Drive dimensions. It is intended for use in multi-layer systems but can be provided as a separate item.

4. OPERATION

System Scanner Controls

Set the MODE control on the System Scanner to SS or to S.
NOTE: The S position may only be used with the drive unit MODE switch in the COL position.

Adjust the System Scanner PRF switch according to word length and the voltmeter multiplier setting, as in the table below

Table 3. Scanner Sampling Speeds

Voltmeter Multiplier	Word Length	Sampling Speed(PRF)
x1	5 digit	1
	7 digit	.5
	9 digit	.5
x2	any of the above	.5
x4	any of the above	.5

Drive Unit SCAN Control

The Scan control on the Typewriter Drive unit may be set to SINGLE or CONT.

In the SINGLE position, a single scan is initiated when the START SCAN button on the System Scanner unit is depressed, or on command from the digital clock.

In the CONT position scanning will be continuous with an appropriate time interval at the end of each scan for carriage return/line feed. Scanning is initiated by depressing the START SCAN button on the System Scanner and is stopped by turning the SCAN control to SINGLE when the scan in progress will be completed, and the unit will come to rest.

Drive Unit MODE Switch

The MODE switch has three positions, TAB, OFF and COL. In the OFF position, there is no drive to the typewriter solenoids. In the COL position, carriage return/line feed operates after

each channel producing a column of figures similar to strip printer output. In the TAB position, carriage return/line feed operates at the end of each scan, producing a tabulated output.

Drive Unit WORD LENGTH Control

The WORD LENGTH control will select a five, seven or nine digit word length, as shown in Table 4.

The five digit format consists of polarity followed by a four digit read out from the digital voltmeter.

The seven digit format consists of a two digit channel identity read out, followed by polarity and a four digit read out from the digital voltmeter.

The nine digit format consists of the seven digit format, followed by two digits showing the voltmeter range and multiplier settings.

NOTE:
(i) No character is printed for positive polarity
(ii) The speed of scanning is limited by word length and multiplier settings. (See Table 3).

Table 4. Word Formats

Channel Identity	Polarity	4 Digit Readout	Range	Multiplier
01	-	1014	5	1
	5 Digit			
	7 Digit			
	9 Digit			

Table 5. Range and Multiplier Identification

Character	Range	Character	Multiplier
1	200V	0	x1
2	20V	1	x2
3	2V	2	x4
4	200mV		
5	20mV		

NOTE: No decimal point indication is given with the voltmeter reading. The position of the decimal point can be determined from range information.

Typewriter Controls

Mains power is applied to the typewriter motor through the switch located at the bottom right-hand underside of the machine. In this state the machine may only be operated manually to insert data prior to automatic recording, if required.

The typewriter solenoids are powered when the drive unit MODE switch is set to either TAB or COL, and the machine may now be driven as part of a system.

Tabulate functions must be set in, as in normal office procedure, by depressing the typewriter SET switch and operating the space bar to give the required width.

Type Out Initiation

The action of the drive unit is initiated automatically by the voltmeter on completion of its conversion, or on command by the system clock.

5. PRINCIPLES OF OPERATION

Basic Principles (Diagram 2)

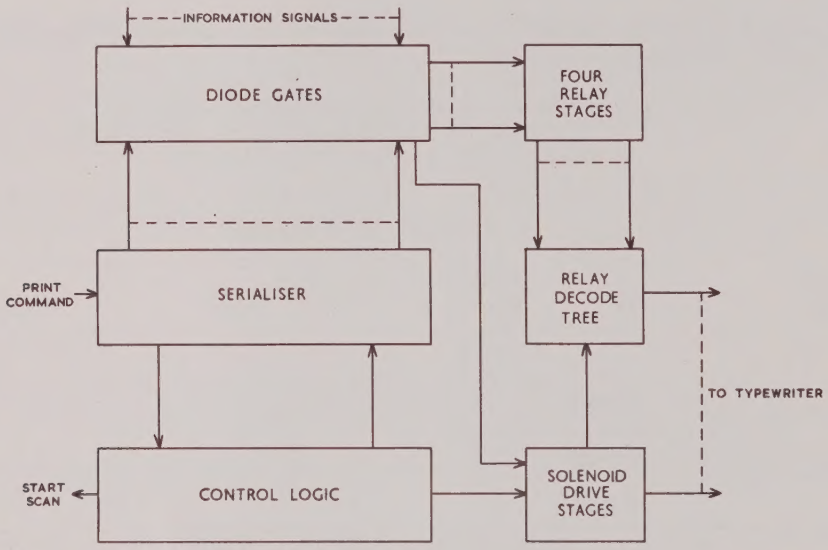


Diagram 2. Simplified Block Diagram: Typewriter Drive Unit LU1469.

Information signals in BCD form, directed to diode gates, are linked to four relays within the unit when the gates are opened in sequence by a serialiser. The relay contacts form a decode tree. This provides paths for a succession of current pulses derived from solenoid drive stages, which fire typewriter solenoids to record the information.

The duration of the pulses and their synchronism with serialiser actions are determined by control logic. This also regulates further drive circuits associated with the auxiliary mechanical functions of the typewriter, i.e. carriage return/line feed, ribbon shift, tabulate, space and minus sign.

Normally, the action of the drive unit commences when it receives an 'end of conversion' signal (print or type command) from a system voltmeter. The unit then records the data processed by the system during one scan. On completion of the recording, it issues a 'start' command signal to the system scanner which initiates another scan-processing-record cycle.

If a suitable time signal source is available, time words may be typed out before the initial scan commences.

Logic Description (Diagram 3)

Notation of Input and Control Signals

In this description, the convention whereby '1' = -6V to -13V and '0' = -1V to +2V is used for BCD inputs and control logic signals. Thus, any line at '0' will clamp the input to its following circuit by swamping any '1' inputs to the circuit.

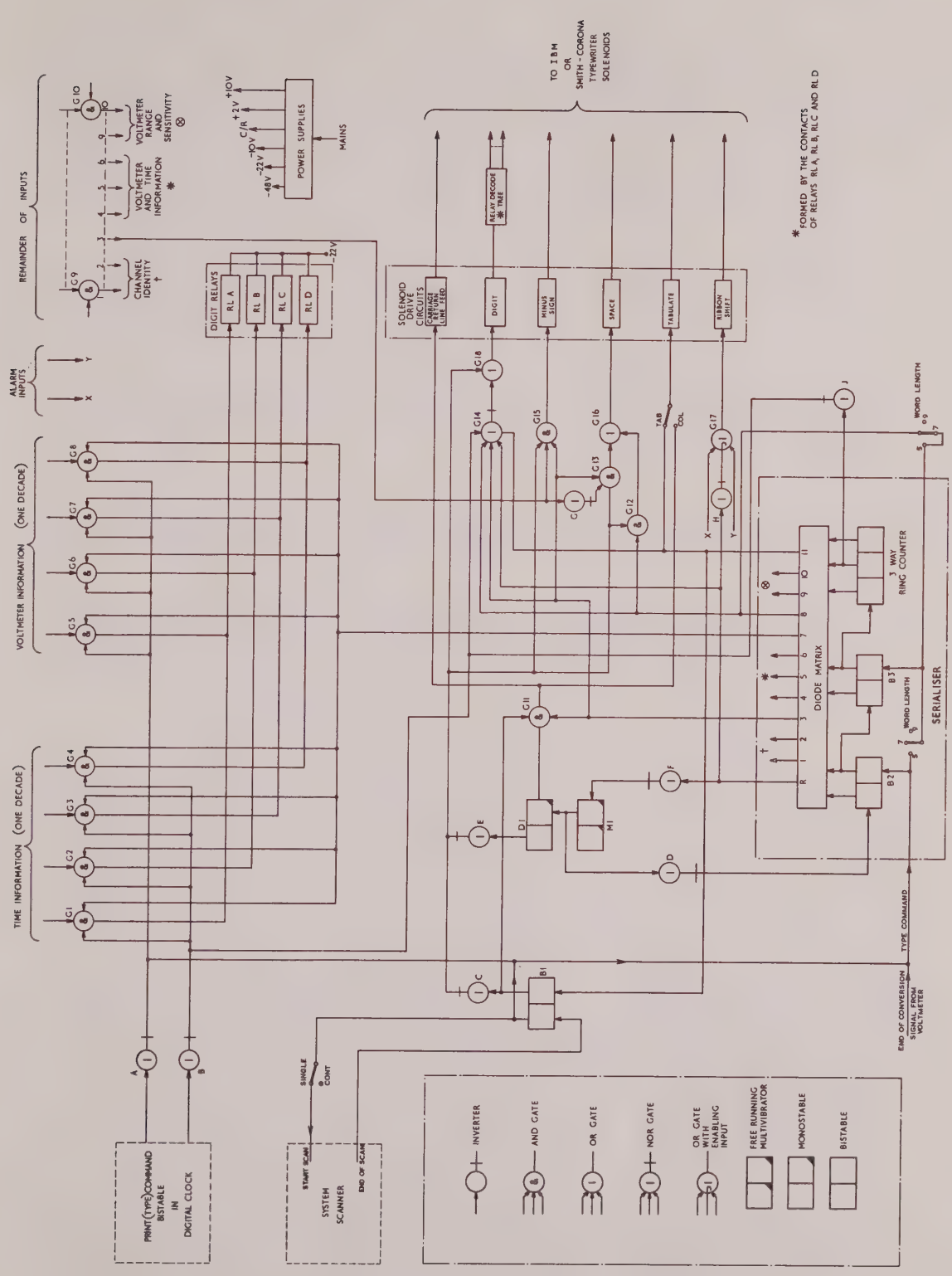


Diagram 3. Logic Diagram Typewriter Drive Unit LU1469.

Inputs

Information signals, generated within the logger system, are applied continuously to diode AND gates, two typical groups, G1 to G4 and G5 to G8, being shown in detailed form in Diagram 3. Gates G1 to G4 accept voltmeter units information; G5 to G8 handle units of minutes from a system clock.

Each gate in the two groups has three inputs, one conveying information and the others carrying clamping signals derived from a serialiser and from a print command bistable in the system clock. The gates provide '1' outputs when all inputs are '1', and '0' outputs if any one input is '0'.

Voltmeter, alarm, polarity and channel identity information may be recorded when the print command bistable is in its 'Not print' state, clamping the time information gates through inverter B. In this case, an end of conversion signal from the voltmeter initiates type-out. When time words are required all gates other than those associated with time inputs are clamped from inverter A, which also directs a type command signal to the serialiser.

The gate outputs control relays RLA, RLB, RLC and RLD, when the gates are opened sequentially by the serialiser. Relay operation actuates a decode tree to provide current drive paths unique to particular digit solenoids in the typewriter.

Serialiser

This comprises two bistables, B2 and B3, and a 3-way ring counter which feed 2 x 2 x 3 combination of outputs into a diode matrix. The matrix decodes the outputs to provide a 12-state circuit.

The stepping action of the circuit commences when the type command signal is applied to it, and the action is continued by pulses from a free running multivibrator gated from the rest position R. The serialising sequence complies with the word order given in the specification and may be limited by means of a WORD LENGTH switch when type out of seven or five character words is required.

Control Logic

While the serialiser is at R, it issues a '1' to the inverter F. The '0' output from F inhibits the oscillations of a multivibrator M1. The '1' from R also inhibits an OR gate G17, associated with the ribbon shift solenoid drive circuits, through inverter H. Additionally, '1' from R also operates a NOR gate G14, which inhibits an AND gate G18, thereby clamping the digit solenoid input line to '0'.

When the serialiser is stepped from rest to its first position, the conditions described in the preceding paragraph will be inverted.

(a) Ribbon Shift

Should an alarm state be detected by the system in which the equipment is used, the output of OR gate G17 will cause operation of the typewriter red ribbon shift mechanism. Absence of alarm will allow the black ribbon to remain in position for typing.

(b) Channel Identity Type Out

The first positive edge generated by M1 fires a monostable D1 which controls an inverter E, thereby opening the digit solenoid drive AND gate G18 for 20 msecs. The serialiser, now on its first position, will have enabled channel identity information signals to operate the relays and set the relay decode tree. The required information will thus be typed out.
The trailing negative going edge of the multivibrator passes through inverter D to step the serialiser to position 2, and the sequence of actions described previously is repeated.
The duration of the multivibrator pulse is about 110 msec., and that of the monostable delay about 20 msec. The periods start at the same instant and allow sufficient time for the firing action of the typewriter solenoid and completion of the mechanical function of the typewriter.

(c) Polarity Information

When on position 3, the serialiser enables polarity information to be indicated. Positive polarity is represented by a '1' and calls up a space on the typewritten record. Negative polarity is represented by '0' and calls up a minus sign. When position 3 is at '1' it supplies inputs to NOR gate G14 to inhibit digit drive, and to the SPACE and MINUS SIGN drive stage AND gates G13 and G15. The polarity input signal is applied to both AND gates,

(i) directly to G15 which is enabled when it receives a '1', and
(ii) indirectly to G13 which is enabled when inverter G receives a '0'. Further '1' inputs to open the enabled gate are derived from the inverter E when monostable D1 is fired by M1. The opened AND gate operates through OR gate G16 to drive the appropriate circuit.

(d) Voltmeter and Time Data

Positions 4 to 7 control time and voltmeter information recording. During type-out, the digit solenoid drive circuit is released for 20 msec. periods while each remaining drive circuit is inhibited by '0' from the serialiser. Refer to the previous paragraphs headed 'Inputs'.

(e) Space Function

Position 8 commands a second space function through G12 followed by G16 mentioned previously in the polarity description.

(f) Voltmeter Range and Multiplier

Positions 9 and 10 control voltmeter range and multiplier recordings through the digit solenoid drive circuits.

(g) Tabulate, Columnate and Carriage Return/Line Feed

Position 11 inhibits the digit solenoid drive circuit and calls up tabulate or columnate functions, according to the position of the COL/TAB MODE switch.

The tabulate function is carried out directly from position 11 at the end of each word, if the MODE switch is set to TAB.

A columnated output, however, is similar to that of a strip printer. Consequently, carriage return/line feed is required at the end of each word and is achieved with the COL/TAB switch at COL.

Carriage return/line feed is also required in the TAB mode at the end of each typewritten line. The 'End of Scan' signal from the system scanner commands it by turning over a carriage return bistable B1. This inhibits digit solenoid drive through inverter C and issues a type command signal to the serialiser. When the serialiser is stepped to position 3, it supplies a '1' input to G11. This gate receives a second input from B1 and a third input from monostable M1 (20msec.). G11 is thus opened for 20msec., to operate the carriage return/line feed solenoid drive circuit. The remainder of the serialising sequence is used to allow the carriage to return to its start position and the line feed action to take place. While the serialiser steps to its rest position, a '0' output from position 11 resets the carriage return/line feed bistable. If continuous scanning is required of the system scanner, an output is directed through a switch linked to the bistable.

(h) Word Length Restriction

The length of a word may be limited to 7 or 5 characters by omitting selection of serialiser positions 1 and 2 or 1, 2, 9 and 10 respectively. The initial type command and position 8 output are used for these restrictions.

6. TECHNICAL DESCRIPTION

Introduction

Circuit diagrams of the unit are provided at the rear of this manual. It will be noted that the printed circuit boards shown on the diagrams are identified by the letters A - G inclusive. Throughout this description references to components on a printed circuit board will be followed by the letter of the board, e.g. MR9 on board C will be shown as MR9 (C).

Inputs

Listed below are the sources and codes of the information signals applied to the drive unit. By convention, binary '1' = -6V to -13V, and binary '0' = -1V to +2V.

Digital Voltmeter:	BCD (8421 code on 3 decades) (21 code on thousands stage) 1 line (Polarity), plus = '1', minus = '0'
Digital Clock:	BCD (8421 code, seconds, minutes and units of hours) (21 code on tens of hours)
Scanner:	BCD (8421 code channel identity, tens and units)
Off Limit Detector:	2 line (Alarm Indication); alarm = '1', absence of alarm = '0'
System Patchboard:	5 line (Voltmeter Range) 2 line (Voltmeter Multiplier)

Input Gates and Relay Decode Tree

The information signals available within a system are connected through plug PLB to diode AND gates on boards B, E, F and G.

The gates are clamped by positive signals from a serialiser until a print command signal is applied to the unit, whereupon the clamping signal is removed from each gate in sequence.

The outputs from each gate operate four relays, RLA, RLB, RLC, RLD, through drive stages on board G. The relay contacts are arranged as a decode tree. They link the output from a digit solenoid drive circuit VT3/VT4(B), to be described later, to a pin on PLC. The relay decode action is in effect a BCD to decimal conversion.

Serialiser Circuit

This circuit comprises two bistables VT1/VT2, VT3/VT4 (D) and a three way ring counter VT1, VT2, VT3, (G1), which supply a 2 x 2 x 3 output to the diode matrix on board D. The matrix converts the bistable/ring counter output to 12 stable states.

While the serialiser is in its rest position, i.e. Pin 11 (D) is held at -10V from R2 (B) it prevents oscillation of the multivibrator VT10/VT11 (C), VT7 (C) is held in conduction and cuts off VT9 (C), the emitter load of one half of the multivibrator. The absence of a positive clamping potential at Pin 11 (D) also allows VT2 (B) to be held in conduction via MR2 (B), the diode forming one input to the NOR gate formed by MR2 (B), MR3 (B), MR4 (B), MR5 (B), MR6 (B) and VT2 (B). VT2 output, directed through MR9 in its collector circuit, clamps the junction of R14 and R15 to common rail. Thus, the solenoid drive circuit VT3/VT4 (B) is held off and solenoid drive action is inhibited.

When the serialiser moves to its first position on command from the System Voltmeter, i.e. when the positive clamping potential is removed from Pin 12(D) and re-applied to Pin 11 (D), the multivibrator is released by reversal of the states of conduction of VT7(C) and VT9(C). The negative edge produced at VT11 collector during cut-off drives VT8 (C) into conduction. VT8 output, however, is swamped by the positive charge held on C10 during this first cycle.

Meanwhile, the re-application of the clamping potential to the rest position of the serialiser enables the NOR gate associated with drive circuit VT3/VT4 (B).

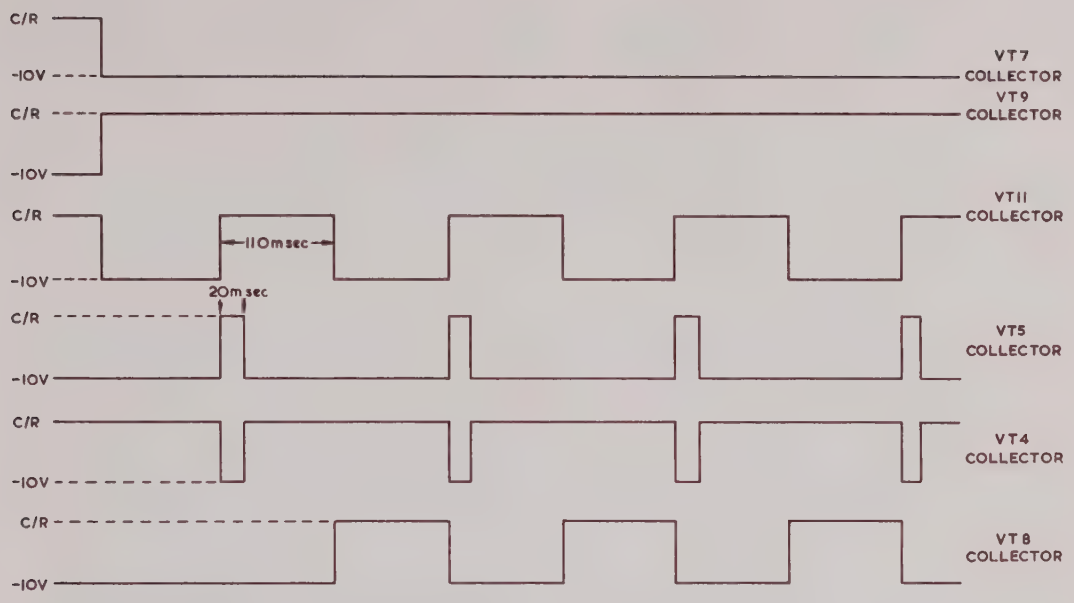


Diagram 4. Logic board (C) Waveforms for first five scanning points.

The first positive going-edge at VT11 (C) collector (see logic board waveform diagram 4) fires monostable VT5/VT6 (C). Consequently VT4 (C) is cut-off and the clamping signal through MR10 (B) is removed from the cathode of MR9 (B). Thus, the digit solenoid drive circuit VT3/VT4 (B) will conduct for the delay period (20msec) of the monostable. This delay allows sufficient time for a typewriter key to be actuated.

Channel Identity Information

The diode input gates associated with position 1 of the serialiser accept 'tens' channel identity information signals. The signals can represent any digit from zero to nine and they operate relays RLA, RLB, RLC and RLD in such a way that the required typewriter key is actuated through the decode tree, connected to PLC.

The duration of each multivibrator pulse is approximately 110msec., giving adequate time for the key to return to rest. At the end of this period, VT8(C) is driven into conduction from the multivibrator and a positive going edge passes through MR9 (C) to the trigger gates of bistable VT1/VT2 (D). The serialiser is thereby stepped to position 2, i.e., Pin 13 (D) goes negative and channel identity 'units' information is typed out.

Polarity Information

Position 3, Pin 14 (D) commands the recording of polarity information. When the serialiser is stepped to this position, a clamping signal is removed from the junction of R3, MR3 (B). VT2 (B) conducts and inhibits the digit drive solenoid circuit. Removal of the clamping signal from position 3 also releases diodes MR5 and MR8 (G).

Polarity information is applied to the unit through Pin BB, PLB, '1' giving a space (signifying a plus sign), and '0' giving a minus sign on the typewritten record. When a '1' is applied to the junction of MR4, MR5, MR6, solenoid drive circuit VT7, VT8 (B) conducts through MR4 (G) for 20 msec. when MR6(G) is released from the collector of VT4 (C). When a '0' is applied, VT4 (G) cuts off and driver VT5, VT6 (B) conducts for 20 msec. through MR12 (G) when MR7 (G) is released.

Voltmeter and Time Information

Positions 4, 5, 6 and 7 (Pins 15, 16, 17 and 18 (D)) control the voltmeter and time information input gates. These gates function in similar manner to the channel identity gates but have, in ad-

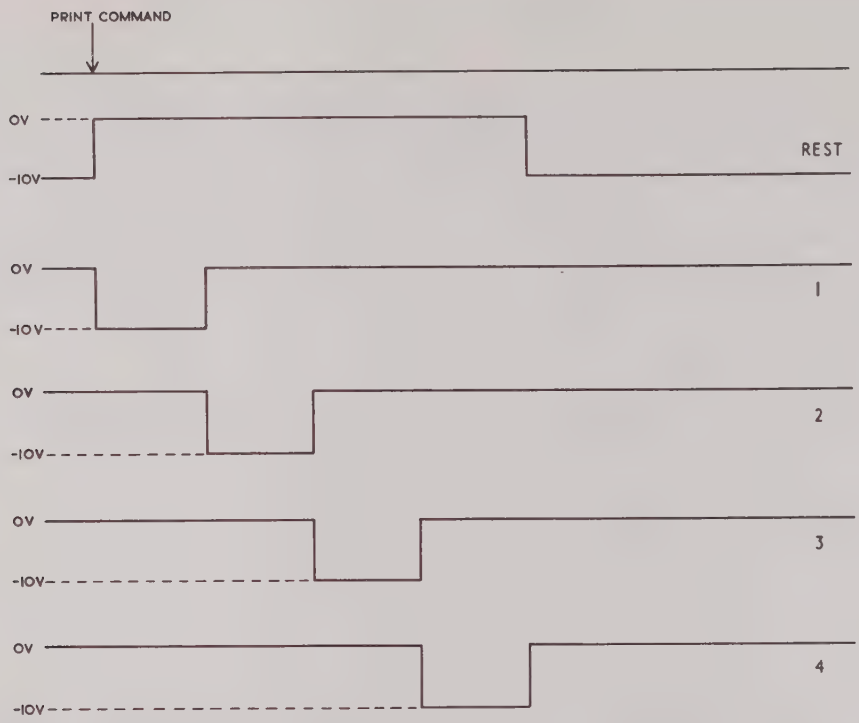


Diagram 5. Serialiser Output Waveforms for first five positions.

dition, clamping inputs derived from two inverters, VT5 and VT6 (G). If a digital clock is incorporated in a system, its print command bistable is used to control the inverters in such a way that all gates except those receiving time inputs, together with gates in the diode matrix controlling serialiser positions rest, 1, 2, 3, 8, 9, 10 and 11, are clamped when time words are to be typed. The leading edge of the clamping signal developed at VT5 collector is used as a type command signal and the serialiser steps through its positions releasing only 4, 5, 6 and 7 to give digital read-out. Removal of the clamping signal from inverter VT6 (G) also releases the junction of MR6, MR7, MR8 (B). This junction is also controlled through VT1 (B). VT1 (B) is driven from a ring counter output associated with time and voltmeter information and is held off during time word positions only. Thus the digit solenoid drive circuit functions through MR10 (B) for 20 msec. periods.

Space

To comply with the format of the specification, a space must be left between a voltmeter record and the next bits of information.

When the serialiser moves to position 8 (pin 19, (D)), the clamping signal is removed from MR4, R4 (B). VT2 conducts and inhibits the digit solenoid drive circuit. Removal of the clamping signal from position 8 enables the -10V rail to be linked through R20 (G) and MR10 (G) to drive VT7, VT8 (B) for 20 msec. when MR9 (G) is released from VT4 (C). The drive circuit conducts and the space function on the typewriter is called up.

Voltmeter Range and Multiplier

Positions 9 and 10 of the serialiser (pins 20 and 21 (D)) control voltmeter range and multiplier recordings and function in the manner of other digital type out points.

The typewriter identifies Digital Voltmeter LM 1420 ranges by recording the appropriate character in the table 5, Section 4.

Type out of characters 1 to 5 is controlled by operation of three relays, RLA, RLB and RLC. Consequently, pins F, H, J, K and L, PLB, feed into a preliminary decode circuit.

Voltmeter multiplier information is applied to two gates formed by MR24, MR27, MR25 MR26 (E). Neither gate is open when x1 sensitivity is to be recorded, '0' being typed. Characters 1 and 2 respectively are typed to indicate x2 and x4 multipliers.

Tabulate, Columnate, Carriage Return/Line Feed

Position 11 (pin 22 (D)) commands carriage return/line feed or the tabulate function, according to the setting of switch SB. Note that this switch has an OFF position to disconnect power from the typewriter solenoids. Thus the unit may serialise but no type out will take place. This feature enables the serialiser to step to its rest position, if set to any random position after mains power is first applied to the unit.

When the serialiser reaches position 11, the clamping signal is removed from the junction of MR5, R5 (B) and the digit solenoid drive circuit is inhibited. If the COL/TAB switch is at TAB the solenoid drive circuit VT14, VT15 (B) conducts through connection of VT14 base to R5 (B).

The typewriter tabulate function is thus called at the end of each word and a succession of words may be spaced along a line according to the TAB stop settings on the typewriter.

With the switch at COL, the base of VT12 (B) is connected to R5 (B). Carriage return/line feed is thus called at the end of a word and a succession of words may be typed out in columnated form to give an output similar to that of a strip printer.

When a complete scan has been typed out an 'end of scan' signal is directed from the system scanner to the pin FF, PLB. This turns over the carriage return/line feed bistable VT1, VT2 (C), which then issues a start signal to the serialiser through MR2 (C). Also, the state of the bistable is such that no clamping signal is applied to MR4 (C), while VT3 (C) is held in conduction clamping the digit solenoid drive circuit. When the serialiser reaches its third position, MR5 (C) is released and, when the monostable is fired 20 msec. later, MR6 (C) is also released. The AND gate formed by the three diodes is thereby opened and, if the COL/TAB switch is at the TAB, the base of VT12 (B) is held at -10V by R9 (C). The drive circuit conducts and the carriage return/line feed functions are called. The remainder of the serialising sequence is used to complete the carriage return/line feed action.

Position 11 goes positive while the serialiser returns to its rest position. The carriage return/line feed bistable resets and issues a return pulse to the Scanner, if switch SC is in the CONT position, to initiate the next scan.

With the COL/TAB switch at COL, serialising action takes place as described but no typewriter functions are called. The return pulse, however, is necessary to re-start scanning.

Word Length.

The preceding sections of the description apply to type out of a nine character word. Type out of a seven character word is accomplished when positions 9 and 10 are by-passed, omitting voltmeter range and multiplier data.

When the serialiser steps from position 8 to position 9 a positive-going edge is directed through SA to bistable VT3, VT4 (D) to step the circuit to position 11.

Five character words are produced by using the initial print command to turn over both serialiser bistables, and also by omitting positions 9 and 10, as for a seven character word.

System Scanner Control

The PRF switch on the system scanner may be set to single scan (SS) or single shot (S) but not scan continuous (SC). As described previously, continuous scanning by the system scanner is commanded by signals from the carriage return/line feed bistable, when 'SS' is used.

Ribbon Shift

This circuit holds the black ribbon in position when type out of a normal (non-alarm) reading is required and holds the red ribbon in position when an alarm state reading is to be typed out.

When power is first applied to the instrument, the operation of relay RLE is delayed by the CR network in the base circuit of VT6 (G5). Consequently, the -10V level at VT9 (B) collector causes conduction of VT10 (B), VT11 (B) through MR13 (B). Common rail potential is thus applied to pin S PLC to fire the black ribbon solenoid.

While the serialiser is in its rest position VT15 (G3) is held in conduction and common rail clamping potential is applied to the junction of MR11, MR15 (B). VT9 (B) is held in its cut-off state. VT16 (G5) conducts to operate RLE. Contacts RLE 1 and RLE 2 (shown in the non-operated mode on the circuit diagram) are held in (a) to clamp the junction of R38, MR13 (B) to common rail, so inhibiting the solenoid drive circuit VT10, VT11, (B), and (b) to connect the collector of VT11 (B) to Pin X, PLC. This pin is linked to the red ribbon shift solenoid in the typewriter.

Should an alarm state be detected by the system, either MR15 (B) or MR11 (B) will be linked to a negative potential on pin z or pin AA, PLB. When the serialiser moves off its rest position the clamping signal will be removed from the junction of MR11, MR15 (B), and the solenoid drive circuit will conduct through MR12 (B), causing the red ribbon shift solenoid to be fired through pin x, PLC.

Meanwhile, C4 (G5) is discharging and, after a delay period of about 20 msec. VT16 (G5) cuts off. The relay then resets to its non-operated state.

At the end of the alarm period, existing for type out of one word, RLE will remain de-energised long enough for the black ribbon to be positioned for typing. The relay will then be energised to prime the red ribbon shift solenoid circuit.

If no alarm detection facilities are available in the system, the ribbon is, of course, set to its black position when power is first applied to the unit, as described previously.

Power Supplies

The mains transformer T1 has two primary windings of 0V - 115V. The windings may be connected in series or in parrallel by means of main selector plug MSP1 to accept either 230V or 115V mains inputs.

A 34-0-34 volts secondary is full-wave rectified and smoothed to give a nominal -48V d.c. supply to drive the solenoids in the typewriter. A 0V-16V secondary is half-wave rectified and smoothed to feed the regulators for the -10V, +2V, and +10V supplies. The same secondary is used to supply an unregulated nominal -22V to drive the internal relays.

7. TEST PROCEDURE

Introduction

The procedure given in this section is basically the production test to which all units are subjected prior to despatch. It is provided to enable the user to confirm the performance of the unit and to make any necessary adjustments.

Equipment

(a) Multi-Range Test Meter, 20000Ω/V

(b) Oscilloscope - Solartron CD1220

(c) IBM Model B or Smith-Corona Compact 250 Electric Typewriter

(d) It is assumed that the module is incorporated in a Compact Logger system which includes a digital clock and an alarm detector.

Access

Release the free connectors and remove the wing nut at the rear of the module. Ease the module out of its cabinet and position it on the bench in such a way that the free connectors which were attached to it may be re-attached through extension leads. A 50-way plug and a 50-way

socket, compatible with the free and fixed connectors and linked together by insulated leads about 3ft. long in a 'one-to-one' pin arrangement, will be suitable for signal coupling.

A three-lead cable with suitable connectors will be required for the power supply.

Release the two holding screws on the right-hand side panel of the module (viewed from the front) and lower the panel. The printed circuit boards may now be hinged out for servicing.

Initial Checks

(a) Ensure that the mains selector plug is set to the correct voltage tapping. Connect the unit to the mains supply.

(b) On Power Board 14669004, check the following:-

(i) +10V between pin 9 and C/R. Adjust RV1 if necessary.
(ii) -10V between pin 11 and C/R. Adjust RV2 if necessary.
(iii) +2V between pin 1 and C/R.
(iv) Nominal -22V on pin 2 must be within the limits 19.8V and 24.2V.
(v) Nominal -48V on pin 8 must be within the limits -46V and -50V while typing is in progress.
(vi) Vary the mains supply over the limits 95V to 130V and 190V to 260V and ensure that the +10V and -10V stabilisers 'hold-in' to within 0.5V.

Test Sequence

(a) Ensure that mains power is applied to both the drive unit and the typewriter.
(b) Set the WORD LENGTH switch to 9; the MODE switch to TAB and the SCAN switch to SINGLE.
(c) Connect a group of representative -12V inputs to the system scanner, i.e. inputs which require type out of all available typewriter characters. Carry out a complete scan and check that correct type out takes place.
(d) Ensure that the red ribbon moves into position when an alarm state is detected on any channel and that the black ribbon is re-positioned when the alarm state is cancelled.
(e) Repeat (c) and (d) with -6V inputs.
(f) Set the WORD LENGTH switch to 7 and repeat (c), (d) and (e).
(g) Set the WORD LENGTH switch to 5 and repeat (c), (d) and (e).
(h) Set the MODE switch to COL and ensure that the tabulated output is replaced by columnated output.
(j) Check that the carriage return/line feed function is carried out at the end of each scan in the TAB mode and at the end of each word in the COL mode.
(k) Check that a positive edge, -10V to 0V, is directed through pin EE, PLB at the end of the carriage return/line feed function, when the SCAN switch is at CONT.
(l) Apply a PRINT TIME command signal from a digital clock and check that a time word is typed out.
(m) Ensure that the speed of the multivibrator on board C (14699003) is 9 pulses per second (110 msec. ±5 msec. for a complete oscillation).

COMPONENTS LIST

for

TYPEWRITER DRIVE LU1469

MAIN UNIT

PRINTED CIRCUIT BOARDS

Description	Solartron Part No.
Gate Logic	B1469 9004
Power Board	B1466 9004
Input Gating One	B1467 9003
Input Gating Two	B1467 9004
Relay Drive	B1469 9002
Solenoid Drive	B1469 9001
Logic Board	B1469 9003

CAPACITORS

Circuit Ref.	Value µF	Tol. %	Rating Volts	Solartron Part No.	Manufacturer & Type	
C1	1000	-20 +50	50	2610 91000	Dubilier	BR 1822
C2	1000	-20 +100	25	2607 91001	Hunts	MEF 109 AT
C3	1000	-20 +100	25	2607 91001	Hunts	MEF 109 AT

SEMICONDUCTORS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Diode	3005 20070	Mullard	OA91
MR2	Diode	3005 20070	Mullard	OA91
MR3	Diode	3005 20070	Mullard	OA91
MR4	Diode	3005 20070	Mullard	OA91
MR5	Diode	3005 20070	Mullard	OA91
MR7	Diode	3005 21110	Ferranti	ZS70
MR8	Diode	3005 21110	Ferranti	ZS70

MISCELLANEOUS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
PLA	Plug 3-way	3523 03030	Bulgin	P429
PLB	Plug 50-way	3529 50040	Amphenol	M
PLC	Plug 20-way	3529 20020	Amphenol	M

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type
SA	Switch, 3 Pole, 3-way	X3731 03060	A.B. Metals
SB	Switch, 3 Pole, 3-way	X3731 03060	A.B. Metals
SC	Switch, 2 Pole, 2-way	X3731 02010	A.B. Metals
RLA	Relay	3006 50690	Oliver Pell Controls Ltd. VP4 CAB-21
RLB	Relay	3006 50690	Oliver Pell Controls Ltd. VP4 CAB-21
RLC	Relay	3006 50690	Oliver Pell Controls Ltd. VP4 CAB-21
RLD	Relay	3006 50690	Oliver Pell Controls Ltd. VP4 CAB-21
RLE	Relay	3006 50410	Oliver Pell Controls Ltd. VP4 CAB-26
FS.1	Fuse 1A	3601 01300	Belling & Lee L562/1
T1	Transformer	X3010 50380	Gardners
MSP1	Mains Supply Panel	3990 00060	McMurdo BMVS/A/4/D2

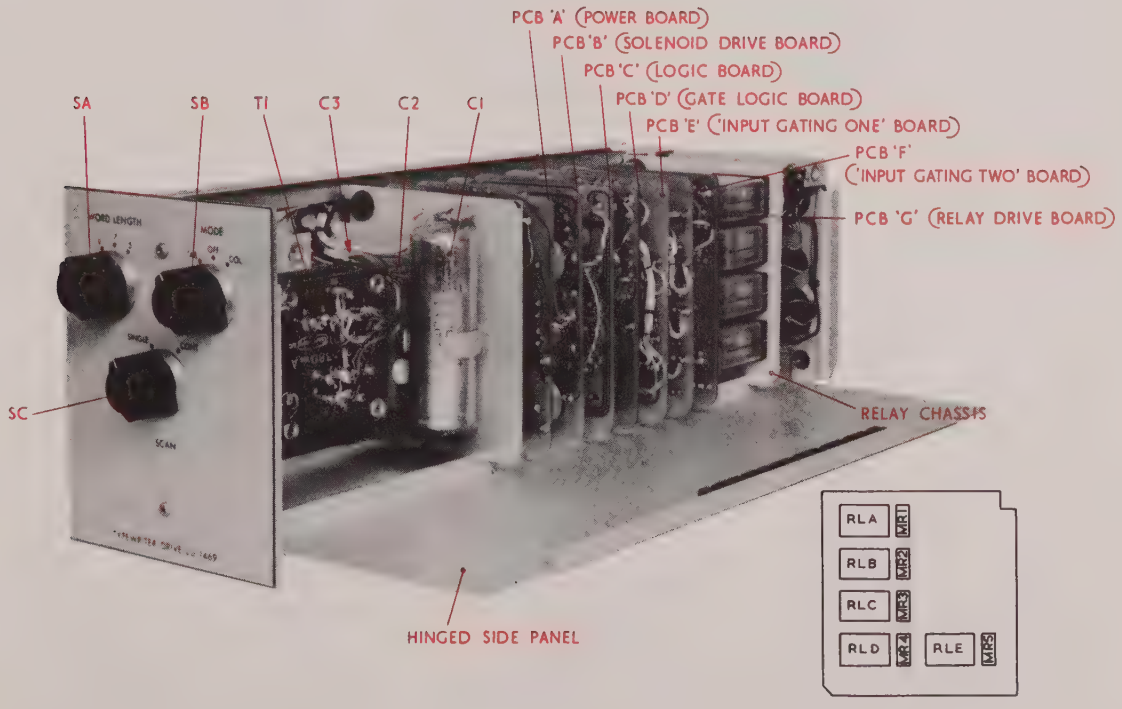


Diagram 6. Component location - Main Unit

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD B 1469 9001

SOLENOID DRIVE

RESISTORS

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R1	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon
R2	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon
R3	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon
R4	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon
R5	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon
R6	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon
R7	56k	10	$\frac{1}{4}$	1723 45600	Dubilier	BTT Carbon
R8	5.6k	10	$\frac{1}{4}$	7123 35600	Dubilier	BTT Carbon
R9	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R10	68k	10	$\frac{1}{4}$	1723 46800	Dubilier	BTT Carbon
R11	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R12	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R13	47k	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT Carbon
R14	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R15	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R16	Not Fitted					
R17	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT Carbon
R18	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R19	47k	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT Carbon
R20	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R21	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R22	Not Fitted					
R23	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT Carbon
R24	47k	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT Carbon
R25	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R26	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R27	Not Fitted					
R28	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT Carbon
R29	2.2k	10	$\frac{1}{4}$	1723 32200	Dubilier	BTT Carbon
R30	4.7k	10	$\frac{1}{4}$	1723 34700	Dubilier	BTT Carbon
R31	4.7k	10	$\frac{1}{4}$	1723 34700	Dubilier	BTT Carbon
R32	2.2k	10	$\frac{1}{4}$	1723 32200	Dubilier	BTT Carbon
R33	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R34	68k	10	$\frac{1}{4}$	1723 46800	Dubilier	BTT Carbon
R35	47k	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT Carbon
R36	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R37	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R38	4.7k	10	$\frac{1}{4}$	1723 34700	Dubilier	BTT Carbon
R39	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT Carbon
R40	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon

PCB B 1469 9001/Cont'd

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R41	47k	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT Carbon
R42	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R43	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT Carbon
R44	Not Fitted					
R45	4.7k	10	$\frac{1}{4}$	1723 34700	Dubilier	BTT Carbon
R46	47k	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT Carbon
R47	2.7k	10	$\frac{1}{4}$	1723 32700	Dubilier	BTT Carbon
R48	Not Fitted					
R49	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT Carbon
R50	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon

CAPACITORS

Circuit Ref.	Value µF	Tol. %	Rating Volts	Solartron Part No.	Manufacturer & Type	
C1	0.047	20	125	2204 44700	Wima	Tropyfol M

SEMICONDUCTORS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Diode	3005 20070	Mullard	OA91
MR2	Diode	3005 20070	Mullard	OA91
MR3	Diode	3005 20070	Mullard	OA91
MR4	Diode	3005 20070	Mullard	OA91
MR5	Diode	3005 20070	Mullard	OA91
MR6	Diode	3005 20070	Mullard	OA91
MR7	Diode	3005 20070	Mullard	OA91
MR8	Diode	3005 20070	Mullard	OA91
MR9	Diode	3005 20070	Mullard	OA91
MR10	Diode	3005 20070	Mullard	OA91
MR11	Diode	3005 20070	Mullard	OA91
MR12	Diode	3005 20070	Mullard	OA91
MR13	Diode	3005 20070	Mullard	OA91
MR14	Diode	3005 20070	Mullard	OA91
MR15	Diode	3005 20070	Mullard	OA91
MR16	Diode	3005 20070	Mullard	OA91
MR17	Diode	3005 20070	Mullard	OA91
MR18	Diode	3005 20070	Mullard	OA91
VT1	Transistor	3005 50680	Mullard	ACY20
VT2	Transistor	3005 50680	Mullard	ACY20
VT3	Transistor	3005 50530	Mullard	ACY20
VT4	Transistor	3005 51800	R.C.A.	2N3053
VT5	Transistor	3005 50530	Mullard	ACY17
VT6	Transistor	3005 51800	R.C.A.	2N3053
VT7	Transistor	3005 50530	Mullard	ACY17
VT8	Transistor	3005 51800	R.C.A.	2N3053
VT9	Transistor	3005 50680	Mullard	ACY20
VT10	Transistor	3005 50530	Mullard	ACY17

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
VT11	Transistor	3005 51800	R. C. A.	2N3053
VT12	Transistor	3005 50530	Mullard	ACY17
VT13	Transistor	3005 51800	R. C. A.	2N3053
VT14	Transistor	3005 50530	Mullard	ACY17
VT15	Transistor	3005 51800	R. C. A.	2N3053

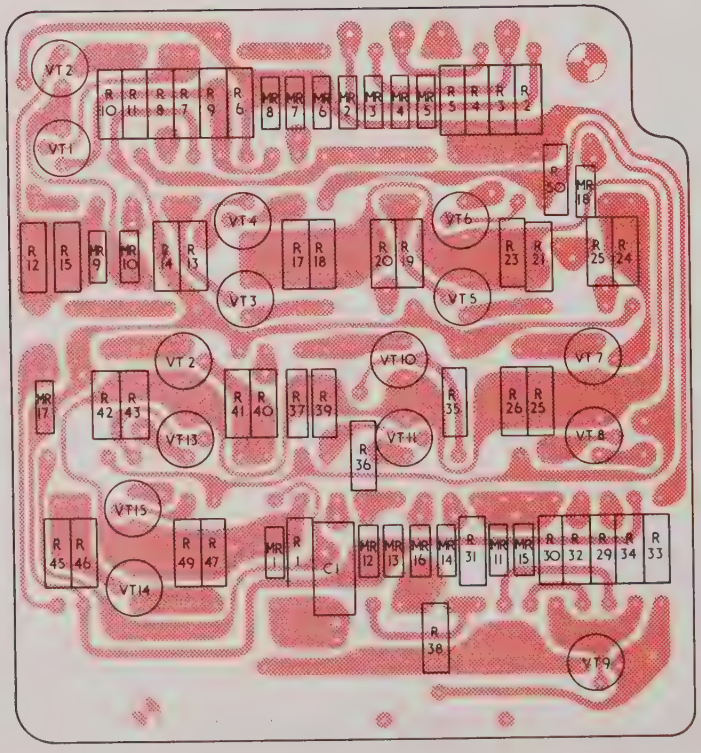


Diagram 7. Component location - Solenoid Drive Board B (14699001).

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD B 1469 9002

RELAY DRIVE

RESISTORS

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R1	2.2k	10	1/4	1723 32200	Dubilier	BTT Carbon
R2	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R3	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R4	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R5	33k	10	1/4	1723 43300	Dubilier	BTT Carbon
R6	2.2k	10	1/4	1723 32200	Dubilier	BTT Carbon
R7	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R8	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R9	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R10	33k	10	1/4	1723 43300	Dubilier	BTT Carbon
R11	2.2k	10	1/4	1723 32200	Dubilier	BTT Carbon
R12	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R13	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R14	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R15	33k	10	1/4	1723 43300	Dubilier	BTT Carbon
R16	5.6k	10	1/4	1723 35600	Dubilier	BTT Carbon
R17	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R18	4.7k	10	1/4	1723 34700	Dubilier	BTT Carbon
R19	12k	10	1/4	1723 41200	Dubilier	BTT Carbon
R20	5.6k	10	1/4	1723 35600	Dubilier	BTT Carbon
R21	3.3k	10	1/4	1723 33300	Dubilier	BTT Carbon
R22	47k	10	1/4	1723 44700	Dubilier	BTT Carbon
R23	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R24	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R25	47k	10	1/4	1723 44700	Dubilier	BTT Carbon
R26	3.3k	10	1/4	1723 33300	Dubilier	BTT Carbon
R27	4.7k	10	1/4	1723 34700	Dubilier	BTT Carbon
R28	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R29	47k	10	1/4	1723 44700	Dubilier	BTT Carbon
R30	1k	10	1/4	1723 31000	Dubilier	BTT Carbon
R31	4.7k	10	1/4	1723 34700	Dubilier	BTT Carbon
R32	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R33	47k	10	1/4	1723 44700	Dubilier	BTT Carbon
R34	1k	10	1/4	1723 31000	Dubilier	BTT Carbon
R35	4.7k	10	1/4	1723 34700	Dubilier	BTT Carbon
R36	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R37	47k	10	1/4	1723 44700	Dubilier	BTT Carbon
R38	1k	10	1/4	1723 31000	Dubilier	BTT Carbon
R39	4.7k	10	1/4	1723 34700	Dubilier	BTT Carbon
R40	68k	10	1/4	1723 46800	Dubilier	BTT Carbon

PCB B 1469 9002/Cont'd

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R41	47k	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT Carbon
R42	1k	10	$\frac{1}{4}$	1723 31000	Dubilier	BTT Carbon
R43	1k	10	$\frac{1}{4}$	1723 31000	Dubilier	BTT Carbon
R44	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon
R45	5.6k	10	$\frac{1}{4}$	1723 35600	Dubilier	BTT Carbon
R46	27k	10	$\frac{1}{4}$	1723 42700	Dubilier	BTT Carbon
R47	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT Carbon
R48	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT Carbon

CAPACITORS

Circuit Ref.	Value µF	Tol. %	Rating Volts	Solartron Part No.	Manufacturer & Type	
C1	0.0022	10	400	2223 32200	Wima	Tropyfol F
C2	0.0022	10	400	2223 32200	Wima	Tropyfol F
C3	0.0022	10	400	2223 32200	Wima	Tropyfol F
C4	12		25	2086 00057	T.C.C.	CE6H
C5	1		50	2610 61000	T.C.C.	CE68DD
C6	1		50	2610 61000	T.C.C.	CE68DD

SEMICONDUCTORS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Diode	3005 20070	Mullard	OA91
MR2	Diode	3005 20070	Mullard	OA91
MR3	Diode	3005 20070	Mullard	OA91
MR4	Diode	3005 20070	Mullard	OA91
MR5	Diode	3005 20070	Mullard	OA91
MR6	Diode	3005 20070	Mullard	OA91
MR7	Diode	3005 20070	Mullard	OA91
MR8	Diode	3005 20070	Mullard	OA91
MR9	Diode	3005 20070	Mullard	OA91
MR10	Diode	3005 20070	Mullard	OA91
MR11	Diode	3005 20070	Mullard	OA91
MR12	Diode	3005 20070	Mullard	OA91
MR13	Diode	3005 20070	Mullard	OA91
VT1	Transistor	3005 50680	Mullard	ACY20
VT2	Transistor	3005 50680	Mullard	ACY20
VT3	Transistor	3005 50680	Mullard	ACY20
VT4	Transistor	3005 50680	Mullard	ACY20
VT5	Transistor	3005 50680	Mullard	ACY20
VT6	Transistor	3005 50680	Mullard	ACY20
VT7	Transistor	3005 50680	Mullard	ACY20
VT8	Transistor	3005 50490	Mullard	ACY21
VT9	Transistor	3005 50680	Mullard	ACY20
VT10	Transistor	3005 50490	Mullard	ACY21

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
VT11	Transistor	3005 50680	Mullard	ACY20
VT12	Transistor	3005 50490	Mullard	ACY21
VT13	Transistor	3005 50680	Mullard	ACY20
VT14	Transistor	3005 50490	Mullard	ACY21
VT15	Transistor	3005 50680	Mullard	ACY20
VT16	Transistor	3005 50490	Mullard	ACY21

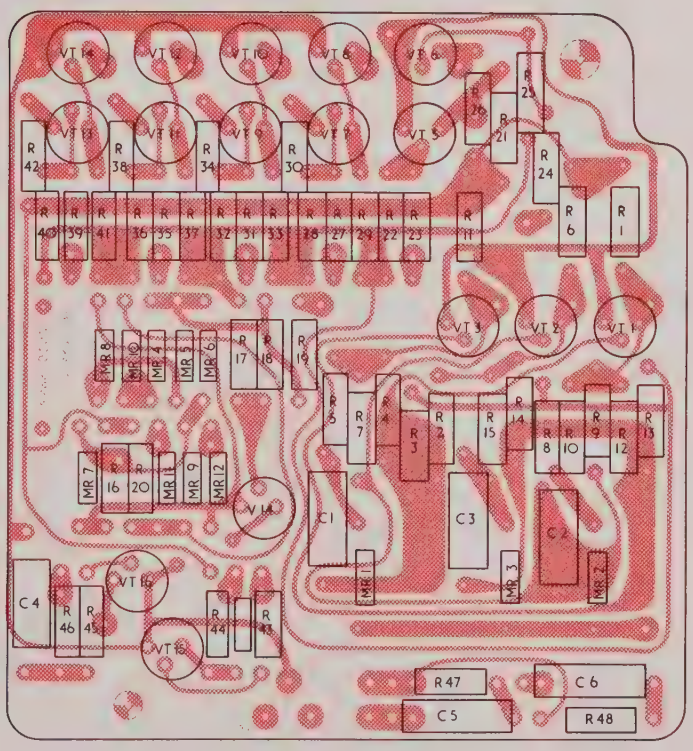


Diagram 8. Component location - Relay Drive Board G (14699002).

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD B 1469 9003

LOGIC BOARD

RESISTORS

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R1	27k	10	1/4	1723 42700	Dubilier	BTT Carbon
R2	2.7k	10	1/4	1723 32700	Dubilier	BTT Carbon
R3	82k	10	1/4	1723 48200	Dubilier	BTT Carbon
R4	18k	10	1/4	1723 41800	Dubilier	BTT Carbon
R5	82k	10	1/4	1723 48200	Dubilier	BTT Carbon
R6	18k	10	1/4	1723 41800	Dubilier	BTT Carbon
R7	2.7k	10	1/4	1723 32700	Dubilier	BTT Carbon
R8	27k	10	1/4	1723 42700	Dubilier	BTT Carbon
R9	12k	10	1/4	1723 41200	Dubilier	BTT Carbon
R10	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R11	56.k	10	1/4	1723 35600	Dubilier	BTT Carbon
R12	2.7k	10	1/4	1723 32700	Dubilier	BTT Carbon
R13	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R14	5.6k	10	1/4	1723 35600	Dubilier	BTT Carbon
R15	3.3k	10	1/4	1723 33300	Dubilier	BTT Carbon
R16	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R17	100k	10	1/4	1723 51000	Dubilier	BTT Carbon
R18	33k	10	1/4	1723 43300	Dubilier	BTT Carbon
R19	3.3k	10	1/4	1723 33300	Dubilier	BTT Carbon
R20	10k	10	1/4	1723 41000	Dubilier	BTT Carbon
R21	2.7k	10	1/4	1723 32700	Dubilier	BTT Carbon
R22	22k	10	1/4	1723 42200	Dubilier	BTT Carbon
R23	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R24	1.5k	10	1/4	1723 31500	Dubilier	BTT Carbon
R25	4.7k	10	1/4	1723 34700	Dubilier	BTT Carbon
R26	2.7k	10	1/4	1723 32700	Dubilier	BTT Carbon
R27	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R28	68k	10	1/4	1723 46800	Dubilier	BTT Carbon
R29	2.7k	10	1/4	1723 32700	Dubilier	BTT Carbon
R30	3.3k	10	1/4	1723 33300	Dubilier	BTT Carbon
R31	100k	10	1/4	1723 51000	Dubilier	BTT Carbon
R32	100k	10	1/4	1723 51000	Dubilier	BTT Carbon
R33	3.3k	10	1/4	1723 33300	Dubilier	BTT Carbon
R34	1k	10	1/4	1723 31000	Dubilier	BTT Carbon
R35	56k	10	1/4	1723 45600	Dubilier	BTT Carbon
R36	120k	10	1/4	1723 51200	Dubilier	BTT Carbon

PCB B 1469 9003/Cont'd

RESISTORS, VARIABLE

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
RV1	1k	20	$\frac{1}{2}$	1100 31220	Welwyn	P25M

CAPACITORS

Circuit Ref.	Value µF	Tol. %	Rating Volts	Solartron Part No.	Manufacturer & Type	
C1	0.01	10	125	2213 41000	Wima	Tropyfol F
C2	Not Fitted					
C3	Not Fitted					
C4	0.01	10	125	2213 41000	Wima	Tropyfol F
C5	0.47	10	125	2203 54700	Wima	Tropyfol M
C6	560p	10	125	2102 25600	G.E.C.	PF
C7	0.1	10	125	2203 51000	Wima	Tropyfol M
C8	1	10	15	2087 00051	Texas	SCM105FP01/ 5D2
C9	1	10	15	2087 00051	Texas	SCM105FP01/ 5D2
C10	0.1	10	125	2203 51000	Wima	Tropyfol M

SEMICONDUCTORS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Diode	3005 20070	Mullard	OA91
MR2	Diode	3005 20070	Mullard	OA91
MR3	Diode	3005 20070	Mullard	OA91
MR4	Diode	3005 20070	Mullard	OA91
MR5	Diode	3005 20070	Mullard	OA91
MR6	Diode	3005 20070	Mullard	OA91
MR7	Diode	3005 20070	Mullard	OA91
MR8	Diode	3005 20070	Mullard	OA91
MR9	Diode	3005 20070	Mullard	OA91
MR10	Diode	3005 20070	Mullard	OA91
MR11	Diode	3005 20850	Mullard	OA47
VT1	Transistor	3005 50680	Mullard	ACY20
VT2	Transistor	3005 50680	Mullard	ACY20
VT3	Transistor	3005 50680	Mullard	ACY20
VT4	Transistor	3005 50680	Mullard	ACY20
VT5	Transistor	3005 50680	Mullard	ACY20
VT6	Transistor	3005 50680	Mullard	ACY20
VT7	Transistor	3005 50680	Mullard	ACY20
VT8	Transistor	3005 50680	Mullard	ACY20
VT9	Transistor	3005 50680	Mullard	ACY20
VT10	Transistor	3005 50490	Mullard	ACY21
VT11	Transistor	3005 50490	Mullard	ACY21

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD B 1469 9004

GATE LOGIC

RESISTORS

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R1	10k	10	$\frac{1}{4}$	1723 41000	Dubilier	BTT Carbon
R2	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R3	33k	10	$\frac{1}{4}$	1723 43300	Dubilier	BTT Carbon
R4	1.5k	10	$\frac{1}{4}$	1723 31500	Dubilier	BTT Carbon
R5	15k	10	$\frac{1}{4}$	1723 41500	Dubilier	BTT Carbon
R6	68k	10	$\frac{1}{4}$	1723 46800	Dubilier	BTT Carbon
R7	68k	10	$\frac{1}{4}$	1723 46800	Dubilier	BTT Carbon
R8	15k	10	$\frac{1}{4}$	1723 41500	Dubilier	BTT Carbon
R9	1.5k	10	$\frac{1}{4}$	1723 31500	Dubilier	BTT Carbon
R10	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R11	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R12	1.5k	10	$\frac{1}{4}$	1723 31500	Dubilier	BTT Carbon
R13	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R14	68k	10	$\frac{1}{4}$	1723 46800	Dubilier	BTT Carbon
R15	68k	10	$\frac{1}{4}$	1723 46800	Dubilier	BTT Carbon
R16	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R17	1.5k	10	$\frac{1}{4}$	1723 31500	Dubilier	BTT Carbon
R18	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon

CAPACITORS

Circuit Ref.	Value µF	Tol. %	Rating Volts	Solartron	Manufacturer & Type	
C1	0.0047	10	125	2213 34701	Wima	Tropyfol F
C2	0.01	10	400	2208 41000	Wima	Tropyfol M
C3	0.1	10	125	2203 51000	Wima	Tropyfol M
C4	0.001	20	400	2224 51000	Wima	Tropyfol F
C5	0.001	20	400	2224 51000	Wima	Tropyfol F
C6	0.01	10	400	2208 41000	Wima	Tropyfol M
C7	0.01	10	400	2208 41000	Wima	Tropyfol M
C8	0.001	20	400	2224 31000	Wima	Tropyfol F
C9	0.001	20	400	2224 31000	Wima	Tropyfol F
C10	0.01	10	400	2208 41000	Wima	Tropyfol M

PCB B 1469 9004/Cont'd

SEMICONDUCTORS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Diode	3005 20070	Mullard	OA91
MR2	Diode	3005 20070	Mullard	OA91
MR3	Diode	3005 20070	Mullard	OA91
MR4	Diode	3005 20070	Mullard	OA91
MR5	Diode	3005 20070	Mullard	OA91
MR6	Diode	3005 20070	Mullard	OA91
MR7	Diode	3005 20070	Mullard	OA91
MR8	Diode	3005 20070	Mullard	OA91
MR9	Diode	3005 20070	Mullard	OA91
MR10	Diode	3005 20070	Mullard	OA91
MR11	Diode	3005 20070	Mullard	OA91
MR12	Diode	3005 20070	Mullard	OA91
MR13	Diode	3005 20070	Mullard	OA91
MR14	Diode	3005 20070	Mullard	OA91
MR15	Diode	3005 20070	Mullard	OA91
MR16	Diode	3005 20070	Mullard	OA91
MR17	Diode	3005 20070	Mullard	OA91
MR18	Diode	3005 20070	Mullard	OA91
MR19	Diode	3005 20070	Mullard	OA91
MR20	Diode	3005 20070	Mullard	OA91
MR21	Diode	3005 20070	Mullard	OA91
MR22	Diode	3005 20070	Mullard	OA91
MR23	Diode	3005 20070	Mullard	OA91
MR24	Diode	3005 20070	Mullard	OA91
MR25	Diode	3005 20070	Mullard	OA91
MR26	Diode	3005 20070	Mullard	OA91
MR27	Diode	3005 20070	Mullard	OA91
MR28	Diode	3005 20070	Mullard	OA91
MR29	Diode	3005 20070	Mullard	OA91
MR30	Diode	3005 20070	Mullard	OA91
MR31	Diode	3005 20070	Mullard	OA91
MR32	Diode	3005 20070	Mullard	OA91
MR33	Diode	3005 20070	Mullard	OA91
MR34	Diode	3005 20070	Mullard	OA91
MR35	Diode	3005 20070	Mullard	OA91
MR36	Diode	3005 20070	Mullard	OA91
MR37	Diode	3005 20070	Mullard	OA91
MR38	Diode	3005 20070	Mullard	OA91
MR39	Diode	3005 20070	Mullard	OA91
MR40	Diode	3005 20070	Mullard	OA91
MR41		3005 20070	Mullard	OA91
MR42	Diode	3005 20070	Mullard	OA91
MR43	Diode	3005 20070	Mullard	OA91
MR44	Diode	3005 20070	Mullard	OA91
MR45	Diode	3005 20070	Mullard	OA91

PCB B 1469 9004/Cont'd

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
VT1	Transistor	3005 50680	Mullard	ACY20
VT2	Transistor	3005 50680	Mullard	ACY20
VT3	Transistor	3005 50680	Mullard	ACY20
VT4	Transistor	3005 50680	Mullard	ACY20

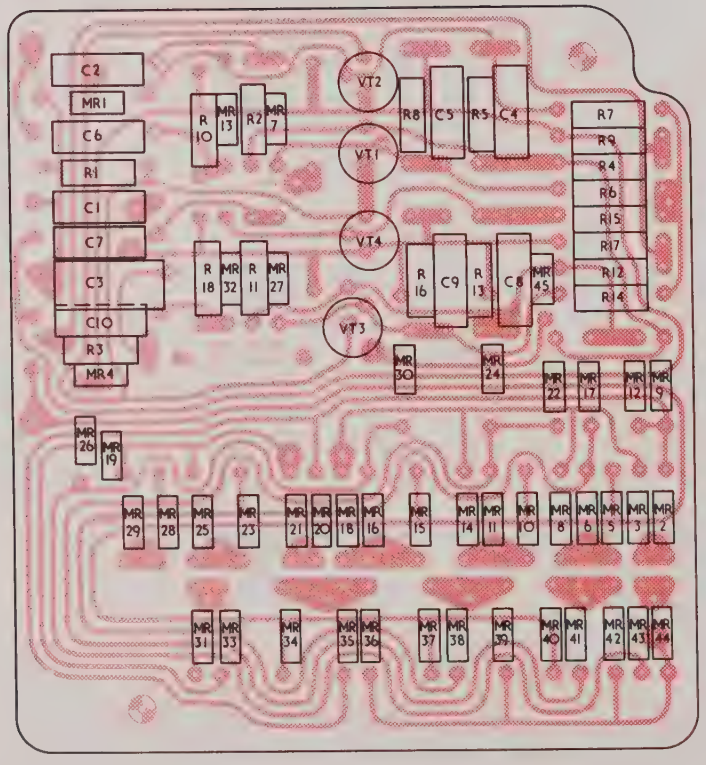


Diagram 9. Component location - Gate logic Board D (14699004).

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD A.

POWER SUPPLY

PART NO. B 1466 9004

RESISTORS

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R1	330	5	2.6	1734 23300	Painton	MV1A WW
R2	4.7k	10	$\frac{1}{4}$	1723 34700	Dubilier	BTT Carbon
R3	220	5	2.6	1734 22200	Painton	MV1A WW
R4	330	5	2.6	1734 23300	Painton	MV1A WW
R5	750	5	$\frac{1}{2}$	1935 27500	Electrosil	TR6 F
R6	680	10	$\frac{1}{4}$	1723 26800	Dubilier	BTT Carbon
R7	270	10	$\frac{1}{4}$	1723 22700	Dubilier	BTT Carbon
R8	270	10	$\frac{1}{4}$	1723 22700	Dubilier	BTT Carbon
R9	330	5	2.6	1734 23300	Painton	MV1A WW
R10	180	5	2.6	1734 21800	Painton	MV1A WW

RESISTORS VARIABLE

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
RV1	250	20	$\frac{1}{2}$	1100 31210	Welwyn	P25M WW
RV2	100	20	$\frac{1}{2}$	1100 31180	Welwyn	P25M WW

SEMICONDUCTORS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Diode	3005 22170	Ferranti	ZS71
MR2	Diode	3005 22170	Ferranti	ZS71
MR3	Diode	3005 21110	Ferranti	ZS70
MR4	Diode	3005 21110	Ferranti	ZS70
MR5	Diode	3005 21580	S.T.C.	Z2A 110F
MR6	Diode	3005 21490	S.T.C.	Z2A 51F
MR7	Diode	3005 20740	Mullard	OAZ 245
VT1	Transistor	3005 50490	Mullard	ACY21
VT2	Transistor	3005 50990	Mullard	OC25
VT3	Transistor	3005 51690	Mullard	BCY38
VT4	Transistor	3005 51800	R.C.A.	2N3053

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD B 1467 9003

INPUT GATING ONE

RESISTORS

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R1	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R2	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R3	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R4	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R5	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R6	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R7	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R8	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R9	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R10	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R11	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R12	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R13	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R14	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R15	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R16	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R17	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon

SEMICONDUCTORS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Diode	3005 20070	Mullard	OA91
MR2	Diode	3005 20070	Mullard	OA91
MR3	Diode	3005 20070	Mullard	OA91
MR4	Diode	3005 20070	Mullard	OA91
MR5	Diode	3005 20070	Mullard	OA91
MR6	Diode	3005 20070	Mullard	OA91
MR7	Diode	3005 20070	Mullard	OA91
MR8	Diode	3005 20070	Mullard	OA91
MR9	Diode	3005 20070	Mullard	OA91
MR10	Diode	3005 20070	Mullard	OA91
MR11	Diode	3005 20070	Mullard	OA91
MR12	Diode	3005 20070	Mullard	OA91
MR13	Diode	3005 20070	Mullard	OA91
MR14	Diode	3005 20070	Mullard	OA91
MR15	Diode	3005 20070	Mullard	OA91

PCB B 1467 9003/Cont'd

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR16	Diode	3005 20070	Mullard	OA91
MR17	Diode	3005 20070	Mullard	OA91
MR18	Diode	3005 20070	Mullard	OA91
MR19	Diode	3005 20070	Mullard	OA91
MR20	Diode	3005 20070	Mullard	OA91
MR21	Diode	3005 20070	Mullard	OA91
MR22	Diode	3005 20070	Mullard	OA91
MR23	Diode	3005 20070	Mullard	OA91
MR24	Diode	3005 20070	Mullard	OA91
MR25	Diode	3005 20070	Mullard	OA91
MR26	Diode	3005 20070	Mullard	OA91
MR27	Diode	3005 20070	Mullard	OA91
MR28	Diode	3005 20070	Mullard	OA91
MR29	Diode	3005 20070	Mullard	OA91
MR30	Diode	3005 20070	Mullard	OA91
MR31	Diode	3005 20070	Mullard	OA91
MR32	Diode	3005 20070	Mullard	OA91
MR33	Diode	3005 20070	Mullard	OA91
MR34	Diode	3005 20070	Mullard	OA91
MR35	Diode	3005 20070	Mullard	OA91
MR36	Diode	3005 20070	Mullard	OA91
MR37	Diode	3005 20070	Mullard	OA91
MR38	Diode	3005 20070	Mullard	OA91
MR39	Diode	3005 20070	Mullard	OA91
MR40	Diode	3005 20070	Mullard	OA91
MR41	Diode	3005 20070	Mullard	OA91
MR42	Diode	3005 20070	Mullard	OA91
MR43	Diode	3005 20070	Mullard	OA91
MR44	Diode	3005 20070	Mullard	OA91
MR45	Diode	3005 20070	Mullard	OA91

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD B 1467 9004

INPUT GATING TWO

RESISTORS

Circuit Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R1	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R2	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R3	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R4	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R5	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R6	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R7	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R8	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R9	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R10	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R11	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R12	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R13	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R14	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R15	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R16	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R17	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R18	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R19	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R20	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R21	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R22	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R23	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon
R24	12k	10	$\frac{1}{4}$	1723 41200	Dubilier	BTT Carbon

SEMICONDUCTORS

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Diode	3005 20070	Mullard	OA91
MR2	Diode	3005 20070	Mullard	OA91
MR3	Diode	3005 20070	Mullard	OA91
MR4	Diode	3005 20070	Mullard	OA91
MR5	Diode	3005 20070	Mullard	OA91
MR6	Diode	3005 20070	Mullard	OA91
MR7	Diode	3005 20070	Mullard	OA91
MR8	Diode	3005 20070	Mullard	OA91
MR9	Diode	3005 20070	Mullard	OA91
MR10	Diode	3005 20070	Mullard	OA91

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR11	Diode	3005 20070	Mullard	OA91
MR12	Diode	3005 20070	Mullard	OA91
MR13	Diode	3005 20070	Mullard	OA91
MR14	Diode	3005 20070	Mullard	OA91
MR15	Diode	3005 20070	Mullard	OA91
MR16	Diode	3005 20070	Mullard	OA91
MR17	Diode	3005 20070	Mullard	OA91
MR18	Diode	3005 20070	Mullard	OA91
MR19	Diode	3005 20070	Mullard	OA91
MR20	Diode	3005 20070	Mullard	OA91
MR21	Diode	3005 20070	Mullard	OA91
MR22	Diode	3005 20070	Mullard	OA91
MR23	Diode	3005 20070	Mullard	OA91
MR24	Diode	3005 20070	Mullard	OA91
MR25	Diode	3005 20070	Mullard	OA91
MR26	Diode	3005 20070	Mullard	OA91
MR27	Diode	3005 20070	Mullard	OA91
MR28	Diode	3005 20070	Mullard	OA91
MR29	Diode	3005 20070	Mullard	OA91
MR30	Diode	3005 20070	Mullard	OA91
MR31	Diode	3005 20070	Mullard	OA91
MR32	Diode	3005 20070	Mullard	OA91
MR33	Diode	3005 20070	Mullard	OA91
MR34	Diode	3005 20070	Mullard	OA91
MR35	Diode	3005 20070	Mullard	OA91
MR36	Diode	3005 20070	Mullard	OA91
MR37	Diode	3005 20070	Mullard	OA91
MR38	Diode	3005 20070	Mullard	OA91
MR39	Diode	3005 20070	Mullard	OA91
MR40	Diode	3005 20070	Mullard	OA91
MR41	Diode	3005 20070	Mullard	OA91
MR42	Diode	3005 20070	Mullard	OA91
MR43	Diode	3005 20070	Mullard	OA91
MR44	Diode	3005 20070	Mullard	OA91
MR45	Diode	3005 20070	Mullard	OA91
MR46	Diode	3005 20070	Mullard	OA91
MR47	Diode	3005 20070	Mullard	OA91
MR48	Diode	3005 20070	Mullard	OA91
MR49	Diode	3005 20070	Mullard	OA91
MR50	Diode	3005 20070	Mullard	OA91
MR51	Diode	3005 20070	Mullard	OA91
MR52	Diode	3005 20070	Mullard	OA91
MR53	Diode	3005 20070	Mullard	OA91
MR54	Diode	3005 20070	Mullard	OA91
MR55	Diode	3005 20070	Mullard	OA91
MR56	Diode	3005 20070	Mullard	OA91
MR57	Diode	3005 20070	Mullard	OA91
MR58	Diode	3005 20070	Mullard	OA91
MR59	Diode	3005 20070	Mullard	OA91
MR60	Diode	3005 20070	Mullard	OA91

Circuit Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR61	Diode	3005 20070	Mullard	OA91
MR62	Diode	3005 20070	Mullard	OA91
MR63	Diode	3005 20070	Mullard	OA91
MR64	Diode	3005 20070	Mullard	OA91
MR65	Diode	3005 20070	Mullard	OA91
MR66	Diode	3005 20070	Mullard	OA91
MR67	Diode	3005 20070	Mullard	OA91
MR68	Diode	3005 20070	Mullard	OA91
MR69	Diode	3005 20070	Mullard	OA91
MR70	Diode	3005 20070	Mullard	OA91
MR71	Diode	3005 20070	Mullard	OA91
MR72	Diode	3005 20070	Mullard	OA91

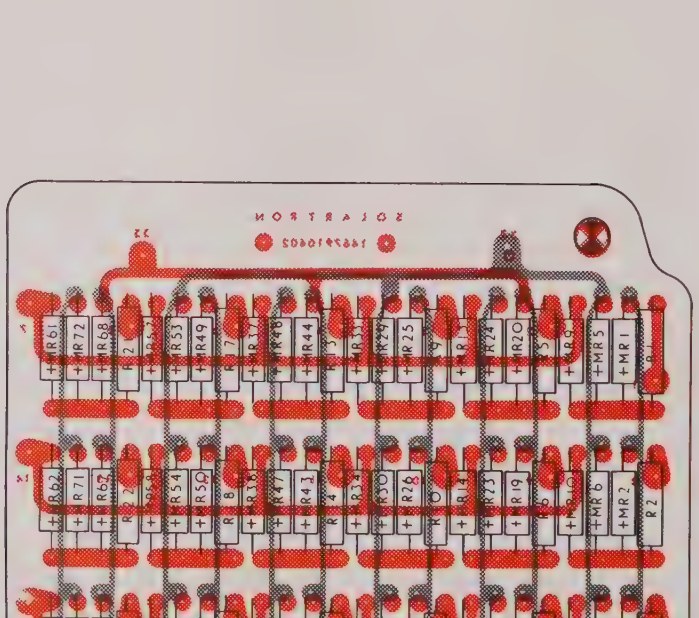


Diagram 10. Component location - Input gating two Board F (14679004).

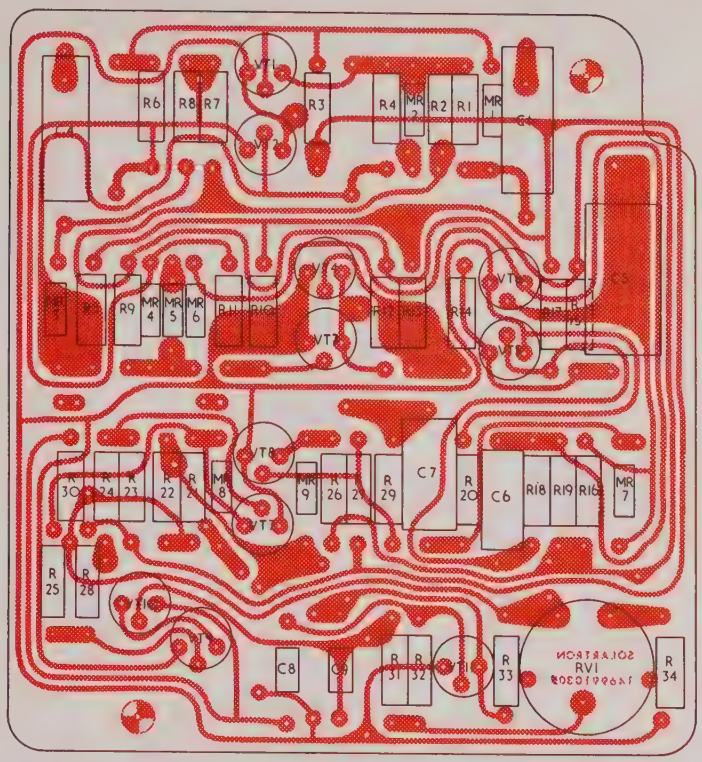


Diagram 11. Component location - Logic Board C (14699003).

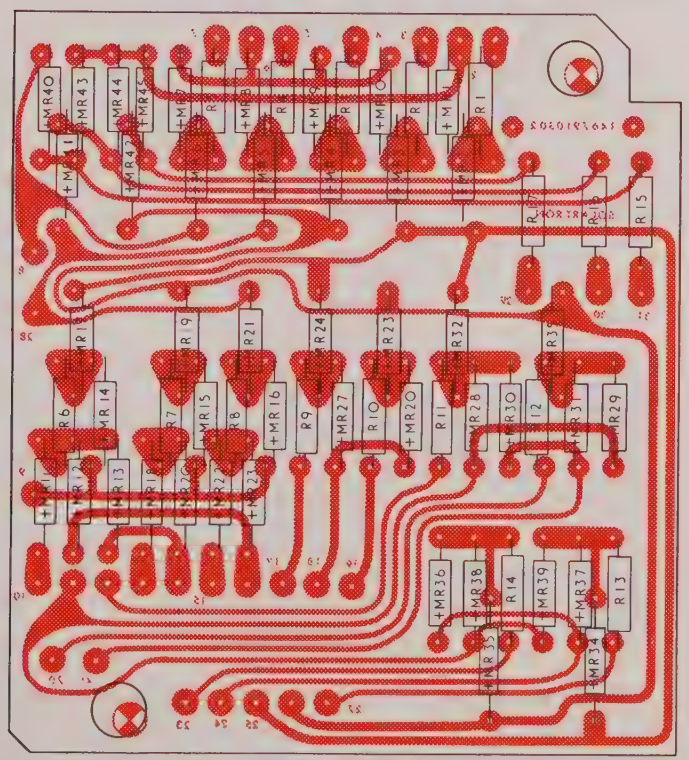


Diagram 12. Component location - Input gating one Board E (14679003).

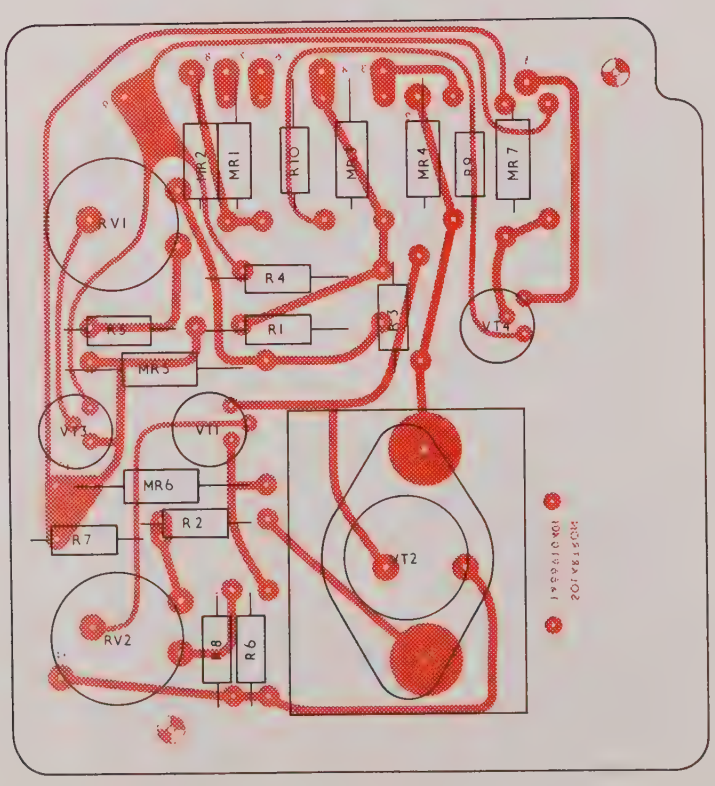
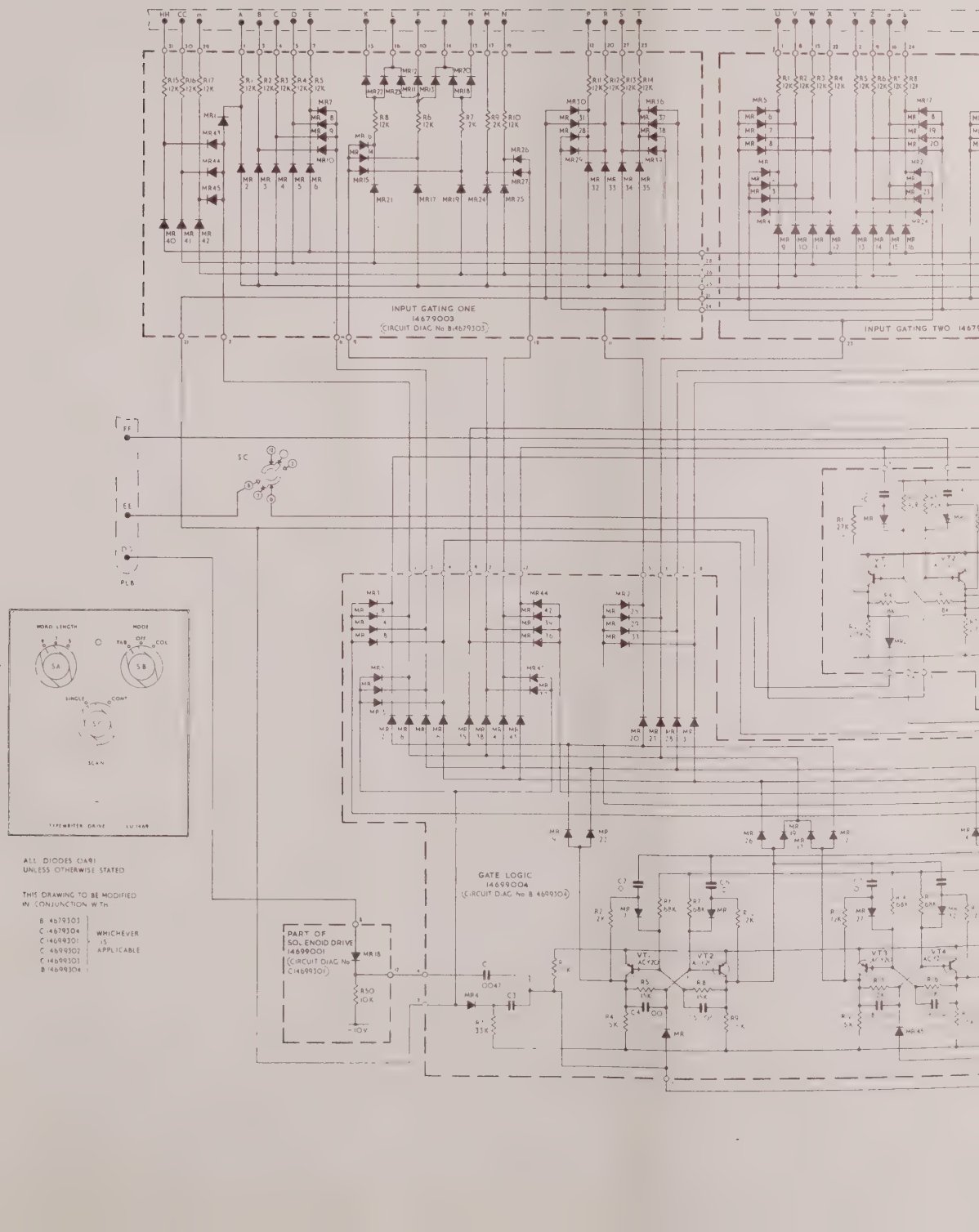
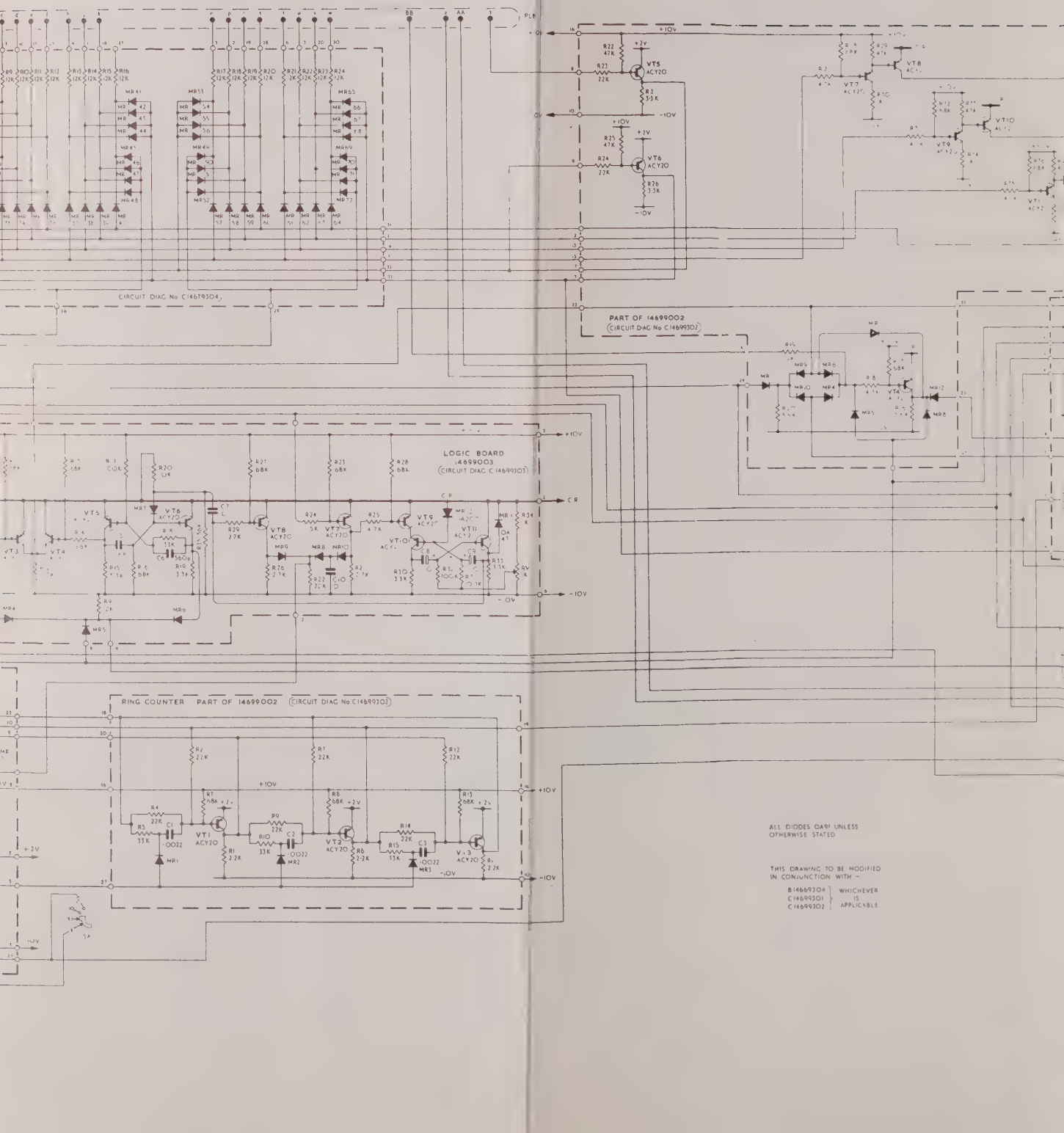
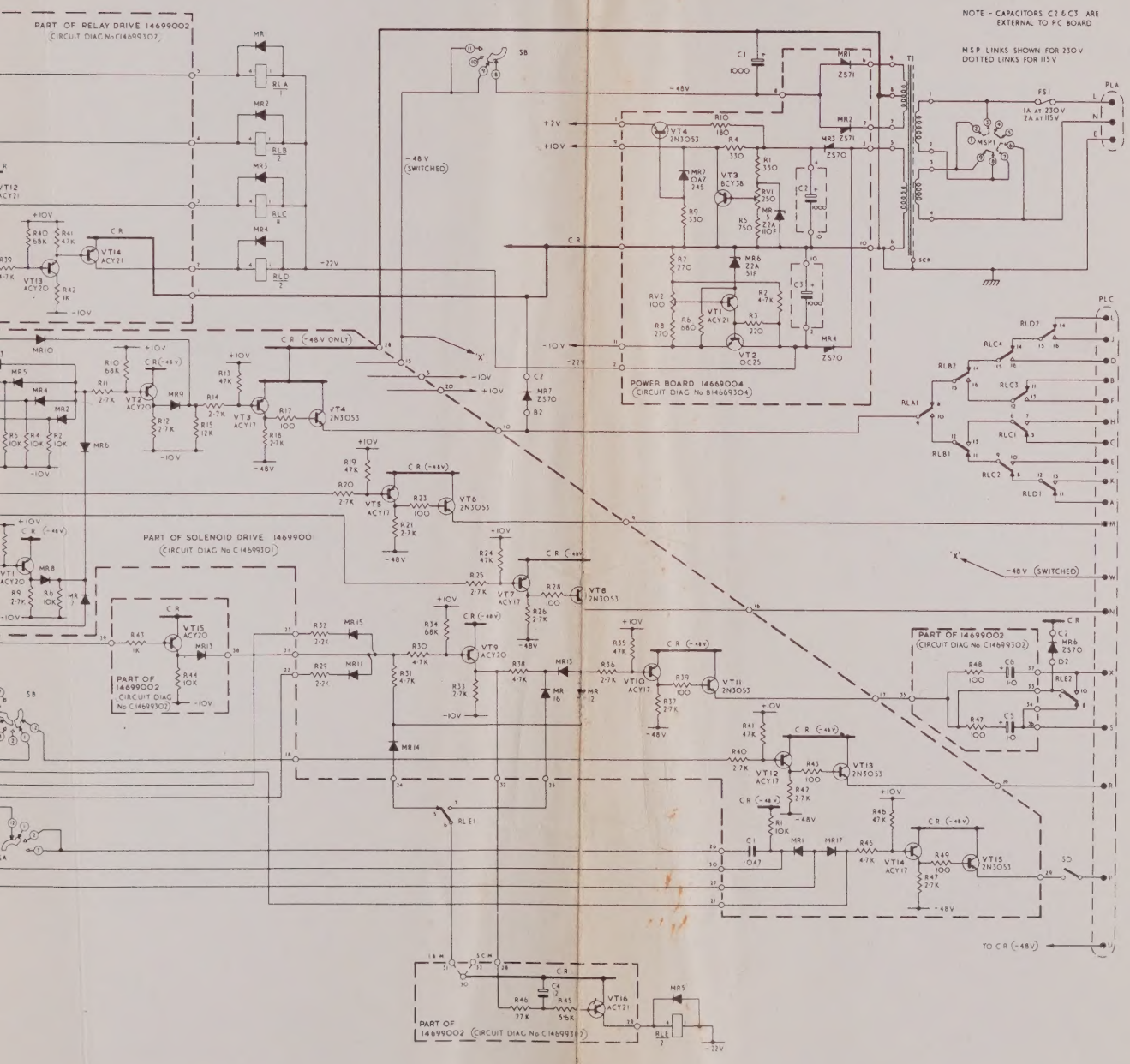


Diagram 13. Component location - Power Board A (14669004).


INPUT GATING ONE
14679003
(CIRCUIT DIAG. No B 4679303)
INPUT GATING TWO 14679
GATE LOGIC
14699004
(CIRCUIT DIAG. No B 4699304)
PART OF
SOLENOID DRIVE
14699001
(CIRCUIT DIAG. No
C 14699301)
WORD LENGTH
MODE
TAB
OFF
COL
SINGLE
CONT
SCAN
TYPEWRITER DRIVE
ALL DIODES OA91
UNLESS OTHERWISE STATED
THIS DRAWING TO BE MODIFIED
IN CONJUNCTION WITH
B 4679303
C 14679304
C 14699301
C 14699302
C 14699303
B 14699304
WHICHEVER
IS
APPLICABLE
-10V


CIRCUIT DIAG No C14679304
PART OF 14699002
(CIRCUIT DIAG No C14699302)
LOGIC BOARD
14699003
(CIRCUIT DIAG C14699303)
RING COUNTER PART OF 14699002 (CIRCUIT DIAG No C14699302)
+10V
-10V
0V
+2V
CR
ALL DIODES OA91 UNLESS OTHERWISE STATED
THIS DRAWING TO BE MODIFIED IN CONJUNCTION WITH -
B14669304
C14699301
C14699302
WHICHEVER IS APPLICABLE


NOTE - CAPACITORS C2 & C3 ARE EXTERNAL TO PC BOARD
M S P LINKS SHOWN FOR 230 V DOTTED LINKS FOR 115 V
PART OF RELAY DRIVE 14699002 (CIRCUIT DIAG No C14699102)
POWER BOARD 14669004 (CIRCUIT DIAG No B14669304)
PART OF SOLENOID DRIVE 14699001 (CIRCUIT DIAG No C14699101)
PART OF 14699002 (CIRCUIT DIAG No C14699102)
-48V (SWITCHED)
TO C R (-48V)

Circuit Diagram LU 1469

MP MASTER
MA24419